

HOLYOKE WATER POWER COMPANY

MOUNT TOM GENERATING STATION

PERMIT NO. MA0005339

COOLING WATER SYSTEM DATA REPORT 40 CFR 122.21(r)(5)

October 2006

Prepared by:

Kleinschmidt
Energy & Water Resource Consultants

HOLYOKE WATER POWER COMPANY

MOUNT TOM GENERATING STATION
PERMIT NO. MA0005339

COOLING WATER SYSTEM DATA REPORT
40 CFR 122.21(r)(5)

October 2006

Prepared by:

Kleinschmidt
Energy & Water Resource Consultants

HOLYOKE WATER POWER COMPANY

MOUNT TOM GENERATING STATION

Permit No. MA0005339

COOLING WATER SYSTEM DATA REPORT

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 COOLING WATER INTAKE DESCRIPTIONS	3
1.1 Cooling Water System Operation and its Relationship to the CWIS	3
1.2 CWIS Periods of Operation and Flow Proportions.....	4
1.3 Electric Fish Barrier	5
2.0 REFERENCES	7

LIST OF APPENDICES

Appendix A Figures and Tables

HOLYOKE WATER POWER COMPANY

MOUNT TOM GENERATING STATION

Permit No. MA0005339

COOLING WATER SYSTEM DATA REPORT

EXECUTIVE SUMMARY

The following Cooling Water System Data Report is being submitted to the U.S. Environmental Protection Agency Region 1 and the Massachusetts Department of Environmental Protection (MA DEP) by Holyoke Water Power Company (HWPC) on behalf of the Mount Tom Generating Station (Mount Tom). The report complies with the U.S. Environmental Protection Agency (EPA) Clean Water Act 316(b) Phase II rule for required data to be submitted when Phase II facilities apply for a reissued NPDES permit 40 CFR 122.22(r)(1)(ii). Phase II existing facilities as defined in 40 CFR 125 subpart J must provide the following information, addressing the specific provisions of 40 CFR 122.21(r)(5), for each cooling water intake structure they use:

1. A narrative description of the operation of the cooling water intake system, its relationship to cooling water intake structures, the proportion of the design intake flow that is used in the system, the number of days of the year the cooling water system is in operation, and seasonal changes in the operation of the system, if applicable.
2. Design and engineering calculations prepared by a qualified professional and supporting data to support the narrative description.

The description contained within this document addresses the criteria required. Operating data is based upon the 2000 through 2004 Discharge Monitoring Reports that Mount Tom Station submits to MA DEP. All of the flow entering the CWIS is used for cooling purposes, including Circulating Water and auxiliary cooling water (River Water) pump flows, therefore a formal calculation is not needed to define the proportion of the design intake flow used for cooling purposes.

The average capacity factors based on 2000-2004 operating data for Mount Tom was 79.9 percent.

A review of the 316(b) rule applicability criteria indicates that Mount Tom qualifies as a Phase II facility: its cooling water intake design flow exceeds 50 MGD; its primary activity is to generate electricity; at least 25% of the water withdrawn is used exclusively for cooling water purposes; and the station was constructed prior to January 17, 2002.

1.0 COOLING WATER INTAKE DESCRIPTIONS

1.1 Cooling Water System Operation and its Relationship to the CWIS

Mount Tom Station is a single unit power plant that has one submerged-type Cooling Water Intake Structure (CWIS) utilizing a once-through, non-contact, condenser cooling water system during the generation process. The circulating water system uses the majority of water coming into the plant. This cooling water absorbs heat in the steam turbine condenser. The River Water system is the secondary cooling water system and is used to provide cooling water to several heat exchangers, including hydrogen coolers, lube oil coolers, the gland steam condenser and other plant auxiliary equipment. Circulating and River Water are discharged into the common underground 8-foot diameter, concrete discharge piping header that terminates in the Connecticut River at a point south of the CWIS along the shoreline.

The non-contact cooling water drawn from the Connecticut River enters the station through a single, open-ended, 8-foot diameter concrete pipe. The non-contact cooling water travels into the screenwell structure that contains the trash rack, traveling screens, Circulating Water pumps, River Water pumps and Screen Wash pumps.

The screenwell structure is essentially divided into two symmetrical sections, or bays, with each bay containing one vertical trash rack, vertical flow-through traveling screen, Circulating Water pump and River Water pump. Water enters the first compartment of the screenwell structure and splits into the two bays, separated by a concrete pier. After cooling water passes through the trash racks, it passes to the traveling screen compartment via an 8' x 8' square sluiceway (with sluice gate) to the front of the traveling screen. After passing through the screen, water is separately drawn into the suction side of the Circulating Water and River Water pumps. These two pumps each have their own separate suction inlets, which are designed integral with the intake structure.

Under normal operating conditions, the Mount Tom unit is operated near full capacity. During the period from May through October, mostly both Circulating Water pumps are operating at 45,000 gpm each and one of the two River Water pumps is operating for a combined design flow rate of 92,500 gpm. Pump design flows are shown in Table 1. During the November through April season, usually one Circulating water pump is used due to the cooler river water temperatures. The number of pumps operating are shown in Tables 2 and 3.

The Screen Wash pumps function to wash debris off the traveling screens when they get clogged with debris. The screens are automatically rotated and the spray wash pump activated when the pressure differential between the upstream and downstream side of the traveling screen (increases) reaches a predetermined point based on the amount of clogging. Drawings of the debris return system are attached in Figure 1.

The recirculation system is used during the winter season if ice is forming in the CWIS (Figures 2 and 3). The recirculation system is not used frequently. A portion of Circulating Water that has absorbed heat in the condensers is forwarded back to the front of the CWIS for deicing. This recirculation flow results in a small reduction in overall plant cooling water inlet flows. Since this flow is considered insignificant in proportion to overall total cooling water flow, recirculation flow is not deducted from the total design cooling water flow.

1.2 CWIS Periods of Operation and Flow Proportions

Mount Tom Station is designed and operated as a "base-load" plant, and operates with a high, net electric capacity factor. The capacity utilization rates for 2000 through 2004 are 84.8%, 85.3%, 75.7%, 83.5%, and 70.1%, respectively (Merchant 2005), based on a generation capacity of 147 MW. The five-year average net capacity utilization rate for Mount Tom is 79.9% (Table 7).

When the plant is operating, one or both Circulating Water pumps and one River Water pump are running. Periodically, the plant will operate the Circulating Water

and/or River Water pumps when the plant is offline for condenser and Circulating Water system maintenance or other reasons.

The number of Circulating Water pumps operating is generally seasonal, depending on Connecticut River water temperature and/or plant operating capacity. In the summer months, both Circulating Water pumps are usually operating. The design intent is to have only one Circulating Water pump operating during the winter season when river water temperature drops below 50°F. Since 2000, operation of the Circulating Water pumps at Mount Tom has remained relatively consistent. Mostly, two-pump operation occurs from May to October (Table 2) and one-pump operation occurs during November to April (Table 3). Plant scheduled outages usually occur in the fall season (Table 6).

Other water uses that contribute to overall CWIS inlet flow are the two, 100% capacity, 250 gpm each, Screen Wash pumps. These pumps are connected in parallel and draw water from the Circulating Water pump discharge piping. One pump is operating while the other pump is in standby. Their flow volume is included in the design flow of the Circulating Water pumps, therefore the 250 gpm flow is not added to the total design flow of 92,500 gpm. The Screen Wash pumps are operated infrequently (Table 4) due to historical problems with operation of the pumps. Most of the time, the fire water system is used for backwashing the traveling screens (Table 5). The fire pump source of water is the discharge pipe from the condenser. The water temperature of the fire pump is the same as the discharge temperatures. Mount Tom is not designed for intake "backwashing" operation thus no heated water is discharged through the intake structure.

1.3 Electric Fish Barrier

An electric fish barrier has been installed and used at the Mount Tom Station since 1959. The normal mode of operation is to have the electric fish barrier turned on. The Model 2A-240 Electric Fish Control Unit is a pulse generator that supplies power to an Electric Fish Screen. The screen consists of an electrode system comprising insulated and grounded electrodes submerged in water. The pulse generator uses an electric circuit which charges a capacitor bank to a preset voltage and automatically discharges stored

energy through a series of Ignitron tubes into the water. A special circuit controls the pulse repetition rate by triggering the ignitron, and can be adjusted to compensate for local water conditions and various species of fish. The system is powered with 110/130 Volt, 60 cycle, 1 phase A.C. supply.

2.0 REFERENCES

- Chain Belt Co. Dwg. No. H16522-1, Rev. 1, dated 3-27-58, General Arrangement of Two Four Post Type Traveling Water Screens 6T-24P-3/8 S.B.", for Mount Tom.
- Electric Fish Screen Co. Dwg. No. 59-100 Sheet 2 of 2, dated 2-10-59, "Electric Fish screen HWPC".
- HWPC Dwg. No. 6058-M-84, Rev. 2, dated 2-10-59, "River Water Cooling Piping Sheet 1".
- HWPC Dwg. No. 6058-M-135, Rev. 2, dated 10-3-59, "Screen Well House – General Arrangement".
- HWPC Dwg. No. 6058-M-152, Rev. 4, dated 6-20-61, "Flow Diagram Cooling Water SH. No. 1".
- HWPC Dwg. No. 6058-M-163, Rev. 7, dated 6-20-61, "Flow Diagram Circulating Water"
- HWPC Dwg. No. 6058-M-185, dated 5-27-58, Mt. Tom Power Plant Unit #1 Station Heat Balance 148,480 KW".
- HWPC Dwg. No. 6058-M-241, Rev. 3, dated 7-17-61, "Piping Screen Well House SH. 1".
- HWPC Dwg. No. 6058-M-242, Rev. 3, dated 7-17-61, "Piping Screen Well House SH. 2".
- HWPC Dwg. No. 6058-S-65, Rev. 3, dated 6-19-59, "Intake & Discharge in Yard".
- HWPC Dwg. No. PMAC-37, "River Cross Sections at Intake".
- Kynard, B., M. Horgan, and E. Theiss. 2003. Spatial Distribution and jumping of Juvenile Shads in the Connecticut River, Massachusetts during Seaward Migration. *Journal of Ichthyology* 43:228-236.
- Merchant, Capacity Utilization for Mount Tom Station Unit No. 1, 2000 through 2005.
- National Pollutant Discharge Elimination System (NPDES) permit, Permit #MA0005339 State Permit No. 278, receiving water Connecticut River.
- National Pollutant Discharge Elimination System (NPDES) Discharge Monitoring Report (DMR), Once-Through Cooling Water Flows, Mt. Tom Station Permit No. MA0005339 from Jan-00 through Dec. 04.
- National Pollutant Discharge Elimination System (NPDES) Permit Monitoring Record, HWPC Mt. Tom Station MA0005339 for Cooling Water Intake Flows from Jan-00 through Dec. 04.

National Pollutant Discharge Elimination System (NPDES) Permit Monitoring Record, HWPC Mt. Tom Station MA0005339 for Discharges No. 002, 005, 007, 008/009, 010/011 from Jan-00 through Dec. 04.

Northeast Utilities System Dwg. No. 43719-96004, Rev. 2, dated 04/05, "Mt. Tom Station SPCC Plan."

US EPA Region 1, Fact Sheet for HWPC Mount. Tom Station, Draft National Pollutant Discharge Elimination System (NPDES), Permit #MA0005339 State Permit No. 278, receiving water Connecticut River.

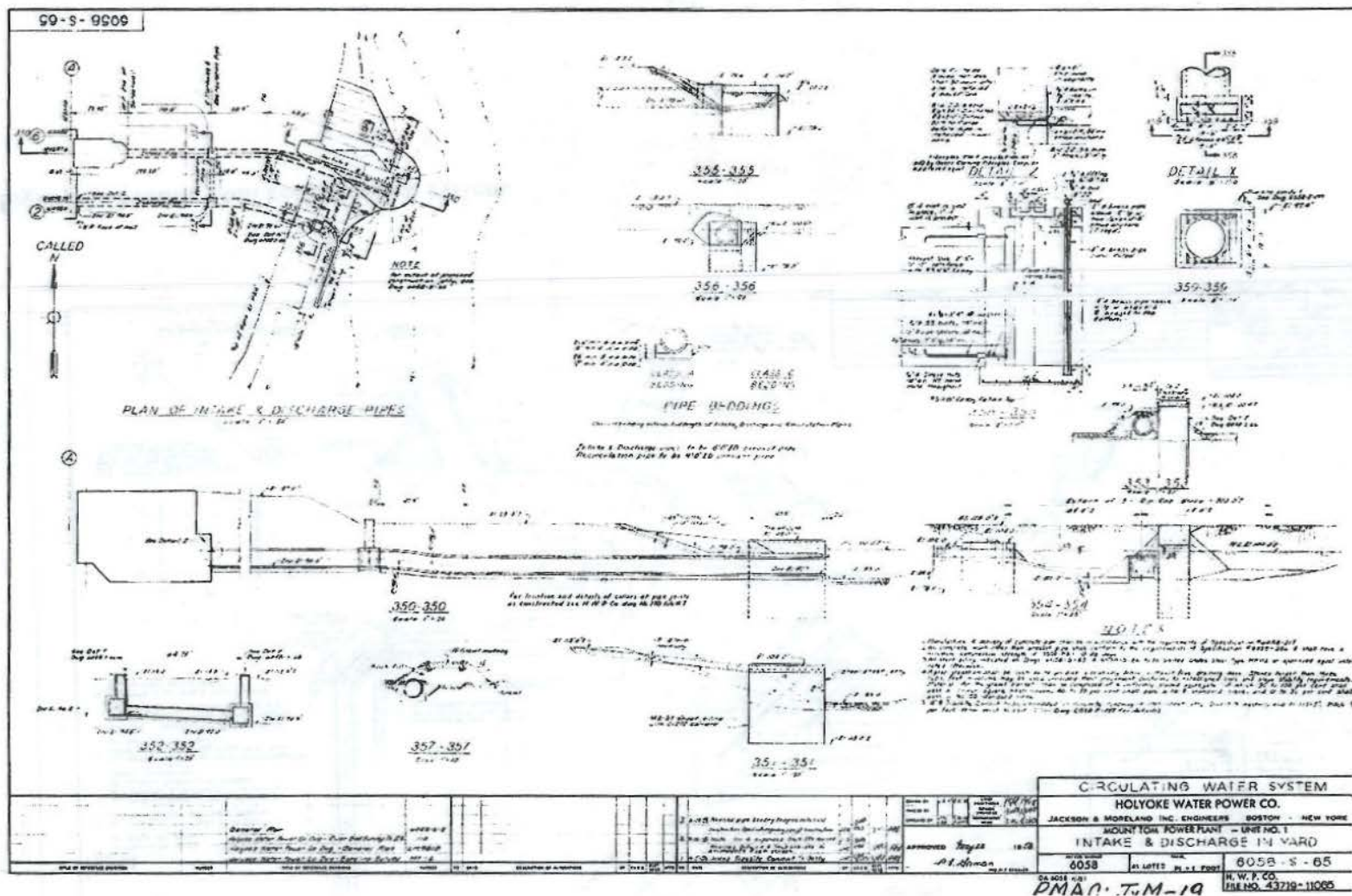
national Pollution Discharge Elimination System (NPDES) Permit Agency Report, 1997.
On: The National Pollution Discharge Elimination System (NPDES) Permit Agency Report, 1997.
See the report for details.

Northwest Indian Council (NWIC), 1997. NWIC, 1997. NWIC, 1997. NWIC, 1997. NWIC, 1997.
NWIC, 1997.

US EPA Region 1, 1997. US EPA Region 1, 1997. US EPA Region 1, 1997. US EPA Region 1, 1997.
US EPA Region 1, 1997. US EPA Region 1, 1997. US EPA Region 1, 1997. US EPA Region 1, 1997.
US EPA Region 1, 1997. US EPA Region 1, 1997. US EPA Region 1, 1997. US EPA Region 1, 1997.

APPENDIX A

FIGURES AND TABLES



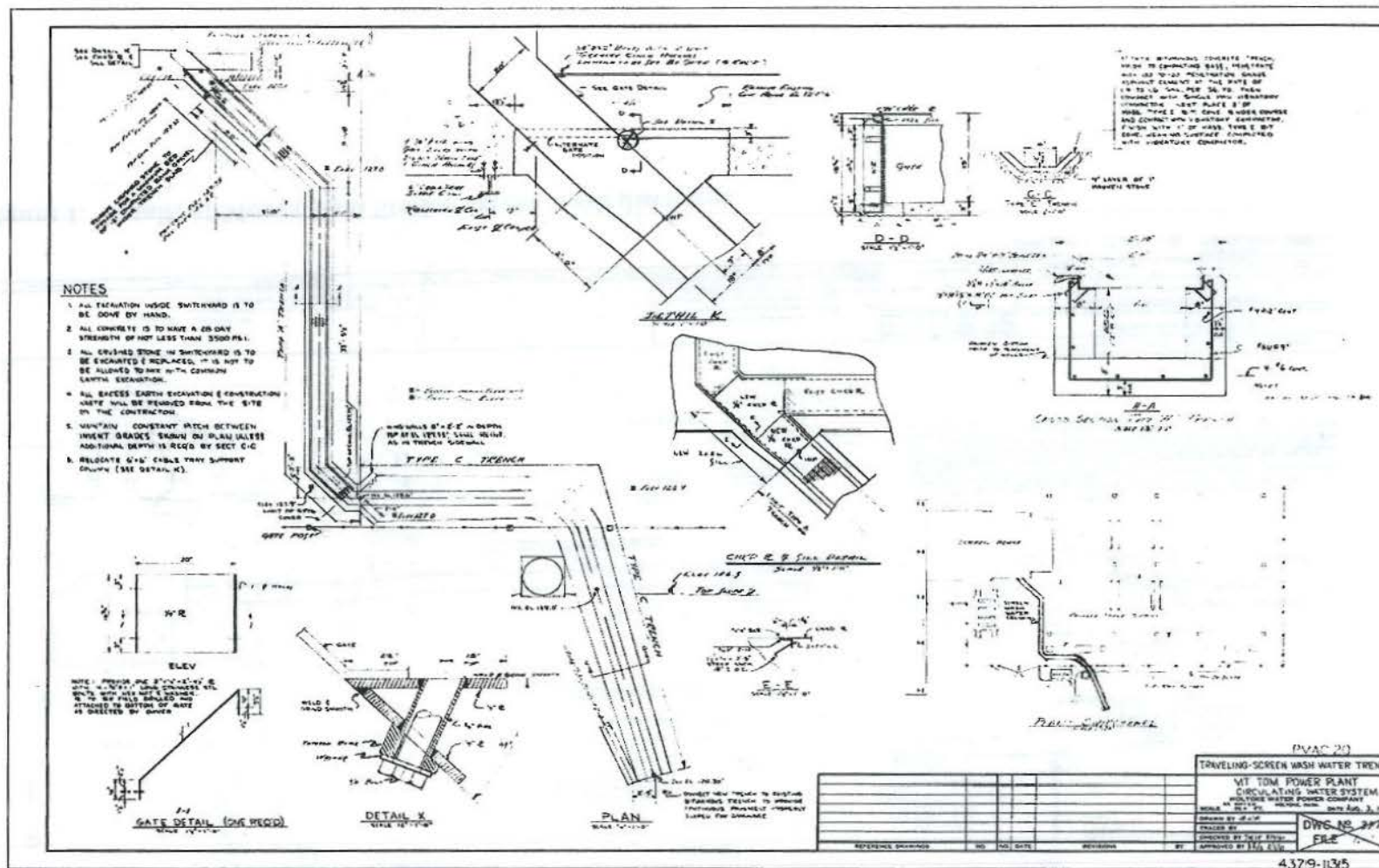


Figure 2. Mount Tom recirculation system.

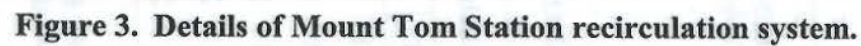


Table 1. Mount Tom Station Design Cooling Water Intake Flows

	Design Intake Flow (gpm)	Design Intake Flow (cfs)	Design Intake Flow (MGD)
Circulating Water Pumps (2)	90,000	200.5	129.6
River Water Pump (1)	2,500	5.6	3.6
Total	92,500	206.1	133.2

Table 2: Two Circulating Water Pump Operation Schedule

Number of Days per Month <u>Two</u> Circulating Water Pumps Operated													
Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
2000	0	0	0	2	27	28	29	30	29	12	0	0	157
2001	0	0	0	0	28	29	30	30	14	31	8	0	170
2002	0	0	0	7	24	26	31	30	12	25	0	0	155
2003	0	0	0	0	17	30	29	31	26	21	0	0	154
2004	0	0	0	3	30	26	29	27	0	5	0	0	120

Notes:

1. HWPC Pump Monitoring Records for years 2000 – 2004 used for above data.
2. Table values do not include the days when only one pump was operated.

Table 3. One Circulating Water Pump Operation Schedule

Number of Days per Month <u>One</u> Circulating Water Pump Operated													
Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
2000	31	29	31	27	4	2	2	1	1	6	30	31	195
2001	31	27	31	30	3	1	1	1	2	0	22	31	180
2002	31	24	29	21	7	1	0	1	18	6	30	31	199
2003	31	28	31	28	2	0	1	0	0	10	29	31	191
2004	31	29	31	27	1	4	0	0	0	18	30	31	202

Notes:

1. HWPC Pump Monitoring Records for years 2000 – 2004 used for above data.
2. Table values do not include the days when two pumps were operated.

Table 4. Days per Month Screen Wash Pump Used For Cleaning Traveling Screens

Number of Days per Month Screen Wash (SW) Pumps Operated													
Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
2000	0	0	1	0	0	0	0	5	0	0	0	1	7
2001	0	0	0	0	0	1	0	0	0	0	0	0	1
2002	0	0	0	0	7	1	0	0	0	0	3	0	11
2003	0	0	0	0	0	2	2	0	2	0	0	15	21
2004	22	0	0	0	0	1	1	0	0	3	11	1	39

Notes:

HWPC Pump Monitoring Records for years 2000 – 2004 used for above data

Table 5. Days per Month Fire Water System Used For Cleaning Traveling Screens

Number of Days per Month Fire Pumps (FP) Operated for Screen Wash													
Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
2000	21	5	22	0	25	23	28	27	27	20	26	22	246
2001	17	15	13	25	30	27	29	29	23	31	29	20	288
2002	22	19	26	27	25	23	27	30	17	29	29	22	296
2003	8	1	15	19	23	28	28	31	27	30	28	20	258
2004	9	15	9	27	23	27	27	27	3	15	22	21	225

Notes:

1. HWPC Pump Monitoring Records for years 2000 – 2004 used for above data

Table 6. Number of Days Mount Tom was Off-Line

Number of Days Mount Tom Off-Line													
Year	J	F	M	A	M	J	J	A	S	O	N	D	Total
2000	1	0	0	1	0	2	1	1	1	13	0	0	20
2001	0	1	0	2	1	1	0	1	14	0	0	1	20
2002	2	5	2	3	2	3	0	1	18	1	1	2	40
2003	0	0	0	2	12	0	2	4	0	0	1	0	20
2004	0	0	2	0	1	2	2	4	30	22	0	0	63

Table 7. Average capacity utilization rates (rounded to tenths) for the past five years at Mount Tom.

Year	Net Generation	Generation Capacity ¹	Approximate Capacity factor
2000	1,095,615	1,291,248	84.8
2001	1,097,808	1,287,720	85.3
2002	975,155	1,287,720	75.7
2003	1,075,749	1,287,720	83.5
2004	905,057	1,291,248	70.1
Mean			79.9

Notes:

1. Generation Capacity based on 147 MW output.